IN THE CLAIMS

1. (currently amended) A light controlling film, the film having a first surface and a second surface, comprising:

a polymerized polymer network, the polymer network varying spatially in a direction normal to the first surface, the polymerized polymer network comprising:

a crosslinked high molecular weight polymeric material; and

a low molecular weight ~~polymeric~~ liquid crystal material, the crosslinked high molecular weight polymeric material provided in an amount less than 20% by weight of the film,

wherein the high molecular weight and the low molecular weight form a material having cholesteric liquid crystal (CLC) order, the CLC order oriented with respect to the first and the second surfaces, the pitch of the CLC order varying non-linearly in a direction perpendicular to the first surface, and

wherein light having a first polarization and a broad bandwidthincident on the first surface is substantially reflected from the film, and wherein light having a second polarization and the broad bandwidth incident on the first surface is not substantially reflected from the film, and wherein an electric field impressed in the film controls the reflection of light having the first polarization when the electric field has a component in a direction normal to the first surface.

2. (canceled)

3. (original) The light controlling film of claim 2, wherein the crosslinked high molecular weight polymeric material is less than 15% by weight of the film.

4. (original) The light controlling film of claim 3, wherein the crosslinked high molecular weight polymeric material is less than 10% by weight of the film.

5. (original) The light controlling film of claim 1, further comprising electrically conducting material adjacent to the first surface for impressing an electric field in the film, the electrically conducting material transmitting the light having the broad bandwidth and the first polarization.

6. (original) The apparatus of claim 5, further comprising a second electrically conducting material adjacent to the second surface, wherein a voltage applied between the first and the second electrically conducting material impresses an electric field on in the film.

7. (original) The apparatus of claim 6, wherein the second electrically conducting material transmits light having the first bandwidth.

8. (original) The apparatus of claim 6, wherein the first polarization is a circular polarization.

9. (original) The apparatus of claim 8, further comprising a transparent quarter wave retardation plate in close proximity to the first surface, whereby linearly polarized light incident on the transparent quarter wave retardation plate is controllably reflected.

10. (original) The apparatus of claim 5, further comprising a means for applying an electric field in the film, the electric field varying spatially over the first surface, whereby polarized light is controllably reflected for
display purposes.

11. (original) The apparatus of claim 5, further comprising a means for applying an electric field in the film, the electric field having a controllable bias field and a controllable adjustment field, whereby the reflectivity of polarized light may be substantially changed by changing the controllable adjustment field.

12. (original) The apparatus of claim 5, further comprising optical communication means, whereby the light in the optical communication means is controlled.

13. (original) The apparatus of claim 5, further comprising means for directing light on to the first surface, and means for receiving reflected light from the first surface, whereby polarized light with a controllable bandwidth produced in the means for receiving reflected light.

14. (original) The apparatus of claim 5, further comprising laser cavity means, whereby the output of the laser cavity means is controlled by the film when the film is used as a reflective element in the laser cavity.

15. (original) The apparatus of claim 5, further comprising a transparent quarter wave retardation plate in close proximity to the first surface, whereby linearly polarized light incident on the transparent quarter wave retardation plate is controllably reflected.

16. (currently amended) A method of making a light controlling film, the film having a first surface and a second surface, comprising:

applying a mixture of high molecular weight polymeric material in an amount less than 20% by weight of the film and low molecular weight ~~polymeric~~ liquid crystal material on a surface which produces a CLC order in the mixture; and crosslinking the high molecular weight polymeric material so that the low molecular weight material significantly diffuses throughout the film and remains distributed in a non uniform fashion across the film from the first surface to the second surface;

wherein light having a first polarization and a broad bandwidth incident on the first surface is substantially reflected from the film, and wherein light having a second polarization and the broad bandwidth incident on the first surface is not substantially reflected from the film, and wherein an electric field impressed in the film substantially decreases the bandwidth of the reflection of light of the first polarization and broad bandwidth.

17. (original) The method of claim 16, wherein the step of crosslinking takes place in a time t1 long compared to the time t2 in which the low molecular weight material can significantly diffuse.

18. (original) The method of claim 17, wherein the step of crosslinking takes place includes irradiation of the film by low intensity ultraviolet radiation.

19. (original) The method of claim 18, wherein the step of crosslinking takes place includes irradiation of the film by high intensity ultraviolet radiation having a radiation intensity of less than 1 mw/cm2.

20. (original) The method of claim 17, wherein the step of crosslinking takes place includes irradiation of the film by high energy electrons where the electron where the electron energy deposition varies substantially throughout the film.

21. (original) The method of claim 17, wherein the step of crosslinking takes place includes irradiation of the film by light which is substantially nonuniformly absorbed throughout the film.

22. (original) The method of claim 17, wherein the step of crosslinking takes place includes heating the film substantially nonuniformly across the film.

23. (currently amended) A system for controlling EM radiation comprising:

a substrate;

a light controlling film of claim 1 ~~a single layer of material~~ on the substrate~~, the material~~ for reflecting the electro-magnetic (EM) radiation, the reflected EM radiation being polarized, the reflected EM radiation having a broad bandwidth;

an electric field generator for generating a variable electric field in the ~~layer of material~~light controlling film; and

a controller for controlling the electric field generator;

whereby the controller controls the electric field generator to generate a field in the light controlling film ~~layer of material~~ and whereby the reflected EM radiation changes in response to the change of the electric field.

24. (Canceled)

25. (currently amended) The light controlling film~~switchable reflective polarizer~~ of claim ~~24~~ 1 in combination with an additional light controlling film~~switchable reflective polarizer~~ reflecting the opposite polarization, whereby the bandwidth of both polarizations of light reflected from the combination is very broad, and whereby the reflectivity of light in the broad bandwidth may be controlled by the electric field.

26. (currently amended) The ~~switchable reflective~~ combination of claim 25 controllably reflecting visible light in combination with a broad band infra-red reflecting and visible transmitting component, whereby visible light may be controllably transmitted and infra-red light may be reflected.

27. (currently amended) The ~~switchable reflective~~ combination of claim 25 controllably reflecting visible light in combination with a light controlling film ~~switchable reflective combination~~ of claim ~~25~~ 1 controllably reflecting infra-red light, whereby visible light may be controllably transmitted and infra-red light may be controllably transmitted.

28-79. (Canceled)